

# Selkirk Mountain Woodland Caribou

*Rangifer tarandus caribou*



U.S. Fish and Wildlife Service  
Pacific Region  
Portland, Oregon  
March, 1994



# RECOVERY PLAN FOR WOODLAND CARIBOU IN THE SELKIRK MOUNTAINS

First Revision  
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Prepared by the Selkirk Mountain Woodland Caribou  
Recovery Team

for  
Region 1  
U.S. Fish and Wildlife Service  
Portland, Oregon

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# EXECUTIVE SUMMARY OF THE RECOVERY PLAN FOR WOODLAND CARIBOU IN THE SELKIRK MOUNTAINS

Current Status: This population of approximately 50 caribou is federally listed as endangered and occurs as 2 herds in northern Idaho, northeastern Washington, and southeastern British Columbia.

Habitat Requirements and Limiting Factors: This population is generally found above approximately 1200 m (4000 feet) elevation in the Selkirk Mountains in Englemann spruce/subalpine fir and western red cedar/western hemlock forest types. The population is threatened by habitat fragmentation and loss, and excessive mortality.

Recovery Objective: Interim objectives are to maintain an increasing population, and to secure and enhance at least 179,000 ha (443,000 acres) of habitat in the Selkirks. A final objective will be developed based on recent data and on population models as recommended in this document.

Recovery Criteria: Manage for an increasing population and manage at least 179,000 ha of habitat to support a self-sustaining caribou population.

## Actions Needed:

1. Manage for an increasing population.
2. Secure and manage at least 179,000 ha of habitat to support a self-sustaining caribou population.
3. Establish a 3rd herd in the western Selkirks in Washington.
4. Determine and establish caribou recovery goals and objectives.
5. Involve and inform public and agency personnel about caribou and caribou management.

Estimated Cost of Recovery (\$1,000's):

<u>Year</u>	<u>Need 1</u>	<u>Need 2</u>	<u>Need 3</u>	<u>Need 4</u>	<u>Need 5</u>	<u>Need 6</u>	<u>Totals</u>
1994	85.0	26.5	42.0	35.0	20.0	10.0	218.5
1995	215.0	91.5	230.0	25.0	20.0	10.0	591.5
1996	185.0	74.0	290.0	5.0	30.0	10.0	594.0
1997	155.0	40.0	185.0	5.0	20.0	10.0	415.0
1998	25.0	40.0	155.0	5.0	20.0	10.0	255.0
1999	25.0	40.0	65.0	5.0	30.0	-	165.0
2000	25.0	40.0	65.0	5.0	20.0	-	155.0
2001	5.0	-	25.0	-	20.0	-	50.0
2002	5.0	-	25.0	-	30.0	-	60.0
2003	5.0	-	25.0	-	20.0	-	50.0
<u>Total Cost</u>	730.0	352.0	1107.0	85.0	230.0	50.0	2554.0

Date of Recovery: Interim objectives may be met by 2003 if all habitat management plans and the population monitoring plan are in place and a 3rd herd has been established in Washington's Selkirk Mountains.

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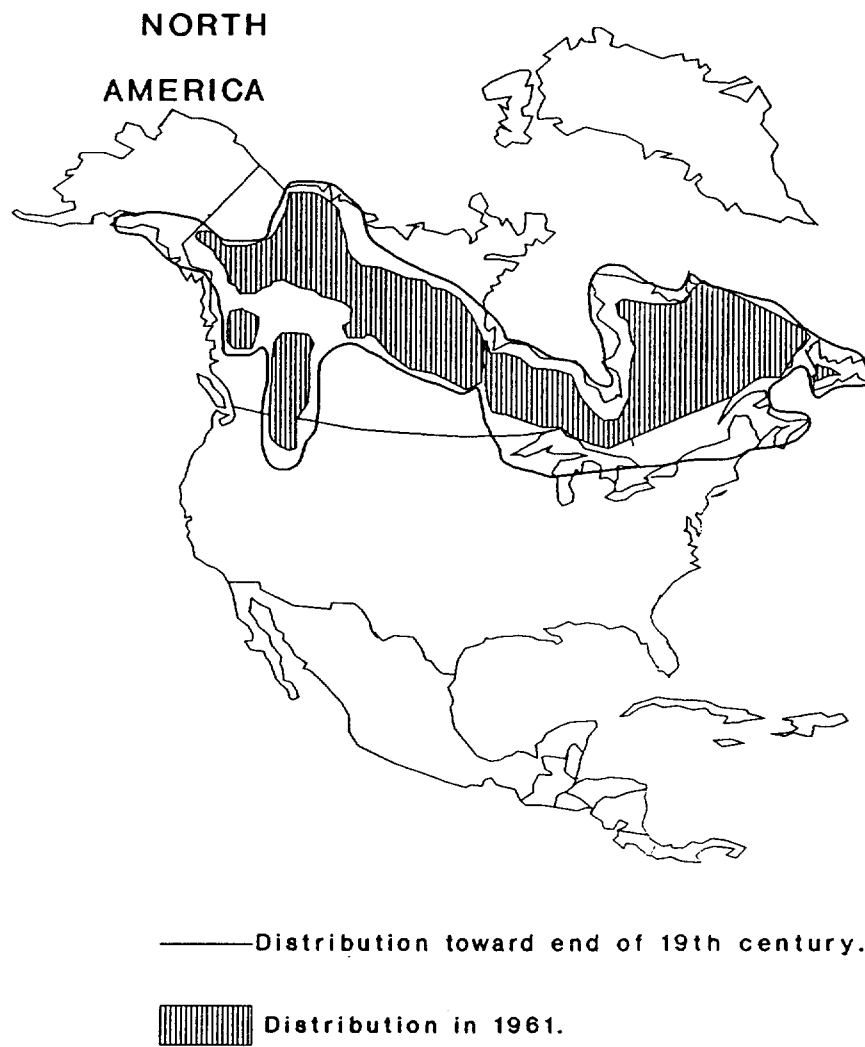
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## PART I. INTRODUCTION

### A. Description

Caribou (Rangifer tarandus), family Cervidae in the Order Artiodactyla, have existed for more than a million years and were once associated with the woolly mammoth (Mammuthus primigenius) (Banfield 1961, Bergerud 1978a). "Caribou" is attributed to early French explorers of eastern North America who derived it from the Micmac Indian term "Xalibu", the pawner or shoveller (Banfield 1961). "Reindeer" is the common European vernacular believed to be derived from "reino", the Lapp name for a young reindeer (Dutilly 1949). Several early taxonomic classifications of the genus are available, including those of Linnaeus (1758), Murray (1866), Lydekker (1898 and 1915), Grant (1902), Seton (1927), Jacobi (1931), Murie (1935), Flerov (1932, 1933, and 1952), Sokolov (1937 and 1959), Ellerman and Morrison-Scott (1951), and Hall and Kelson (1959). The most recent and widely accepted classification of Rangifer was by Banfield (1961) who listed 9 subspecies, 2 of which are extinct. The woodland caribou (R. t. caribou) is restricted to North America (Fig. 1), and is further broken down into 2 "ecotypes": mountain and northern (Scott 1985, Stevenson and Hatler 1985). Ecotypic differentiation is based on habitat use and behavior patterns and is not a genetic consideration. Because the animals concerned are of the same subspecies, genetics is not an issue. The mountain ecotype of woodland caribou is found in eastern British Columbia (B.C.) and western Alberta south of Prince George, B.C. The Selkirk Mountains caribou ecosystem (Appendix A) is within the range of the mountain ecotype. Northern ecotype caribou range over much of the remainder of Canada.

Figure 1. Woodland caribou distribution adapted from Banfield (1961) and Stevenson and Hatler (1985).



Woodland caribou are medium-sized members of the deer family with males approaching 275 kilograms (600 pounds) and females 135 kilograms (300 pounds). Caribou are distinguished from other members of the deer family by their large hooves, broad muzzles, and the distinctive antlers that both sexes develop annually. Males drop their antlers during November-April and females during May-June. The pelage of the woodland caribou ranges from a deep chocolate brown in midsummer to a grayish-tan during spring. Adult males develop a distinctive white mane during the rut.

The Selkirk caribou population (Selkirk caribou), to which this recovery plan pertains, was emergency-listed as endangered under the Endangered Species Act of 1973 (in the Federal Register) on January 14, 1983. A final ruling of endangered status was listed in the Federal Register on February 29, 1984.

## **B. Distribution**

Prior to 1900, woodland caribou were distributed throughout much of Canada, and the northeastern, northcentral, and northwestern conterminous United States (Fig. 1). Caribou are occasionally sighted in Minnesota (Mech 1982), but they disappeared from Maine, Vermont, New Hampshire, Michigan, and Wisconsin (Fashingbauer 1965, McCollough 1990). There was an unsuccessful attempt to reintroduce caribou to Maine in the 1980s (McCullough 1992).

The last confirmed report of a caribou in Montana occurred in 1958 (Manley 1986). Since then several unconfirmed sightings have been reported and tracks were documented in northwestern Montana in the mid-1980s (Manly 1986, USFS files). The Forest Service has listed caribou in Montana as a sensitive species and current Forest Service policy is to develop a conservation strategy for the species.

Caribou in Idaho historically occurred as far south as the Salmon River (Evans 1960). Since the 1960s the last remaining woodland caribou population in the United States has restricted its range to the Selkirk Mountains of northeastern Washington,

northern Idaho, and southeastern British Columbia. As recently as the 1950s, the Selkirk population consisted of approximately 100 animals (Flinn 1956, Evans 1960). However, by the early 1980s this population had dwindled to 25-30 individuals whose distribution centered around Stagleap Provincial Park, British Columbia (Scott and Servheen 1985).

### C. Recovery Area

The recovery area for caribou in the Selkirk Mountains is comprised of approximately 5,700 km<sup>2</sup> in northern Idaho, northeastern Washington, and southern B.C. About 47% of the area lies in B.C. and 53% lies in the U.S. The U.S. portion includes the Salmo-Priest Wilderness and other portions of the Colville and Idaho Panhandle National Forests, Idaho Department of Lands holdings, and scattered private parcels.

The area is characterized by long, steep-sided drainages. Elevations range from 540 to 2,375 m. The Pacific maritime-continental climate produces long winters and short summers. Most of the precipitation occurs during winter, with a second peak in spring.

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The area is dominated by cedar (Thuja plicata)/hemlock (Tsuga heterophylla) and spruce (Picea engelmannii)/fir (Abies lasiocarpa) forests. Historically, wildfire was the primary disturbance factor in the Selkirks. Timber management and recreation are currently the principal land uses.

Other threatened or endangered species including bald eagle (Haliaeetus leucocephalus), grizzly bear (Ursus arctos), peregrine falcon (Falco peregrinus), and gray wolf (Canis lupus) also occur in the ecosystem. They are native species, historically coexisting in the Selkirk ecosystem.

A more complete description of the Recovery Area is provided by Compton et al. (1991).

### D. Habitat Use/Movement Patterns

The habitat use and movement patterns of the woodland

caribou in the Selkirk Mountains have been studied in some depth since the first recovery plan was written (Table 1), and several studies on other populations have been completed. Woodland caribou, in general, do not make the long, mass migrations for which tundra caribou (R. t. groenlandicus) are famous. However, seasonal movements and migrations are characteristic of many, but

Table 1. General description of seasonal habitats used by Selkirk caribou (Rominger and Oldemeyer 1989, Servheen and Lyon 1989, Warren 1990).

Season	Description
Early Winter	Mature to old-growth cedar-hemlock and spruce-fir stands, 70%+ canopy closure, high windthrow and lichen densities.
Late Winter	High elevation, open-canopied spruce-fir stands, high lichen density.
Spring	Mature timber with canopy openings.
Calving	Secluded, high elevation, mature-old growth forest.
Summer	Relatively flat terrain, abundant understory cover, variable overstories.
Fall	Mature old-growth stands with dense understories.

not all, woodland caribou herds (Shoesmith and Storey 1978, Bloomfield 1980, Simpson et al. 1985, Antifeau 1987, Cichowski 1989, Servheen and Lyon 1989). Generally, the mountain ecotype of woodland caribou exhibit five distinct seasonal movements. In early winter caribou shift to lower elevation habitats best characterized by mature to old-growth subalpine fir/Engelmann

spruce and western hemlock/western red cedar forest types and the ecotone between these on moderate slopes with a high density of recently windthrown arboreal lichen-bearing trees (Rominger unpubl. rpt.). These habitats occur generally between 1200 and 1900 meters (4,000 - 6,200 feet) elevation. During early winter these dense canopied habitats intercept snow, reducing snow depth on the forest floor and providing green forage later in the season than more exposed forest communities at higher elevations. Early winter habitat is considered to be the most critical to the Selkirk caribou population because of the rapid accumulation of deep soft snow which covers vascular forage and makes locomotion difficult, limited availability of suitable habitat, and relatively low availability of arboreal lichens (Simpson et al. 1985, Rominger and Oldemeyer 1989, Servheen and Lyon 1989). Selkirk caribou have returned to the same areas of early winter habitat year after year.

The movement from early winter to late winter habitat occurs as snow accumulates and hardens, allowing easier movement and lifting the caribou into the lichen-bearing forest canopy. This may occur anywhere between mid-December and mid-January. Simpson et al. (1987) and Servheen and Lyon (1989) used January 15 as the end of early winter and the beginning of late winter.

Late winter is characterized by deep snow (up to 5 m on mountain tops) and a snow pack capable of supporting a caribou (Scott and Servheen 1985). The Englemann spruce/subalpine fir forests used during this period are characterized by open canopies

(26-50% canopy cover), basal area of 2.3 to 17.2 m<sup>2</sup>/ha (10.0-75.0 ft<sup>2</sup>/ac), stem densities of 741 to 1,235/ha (300-500/ac) and are generally above 1,828 m (6,000 ft) elevation (Servheen and Lyon 1989). Areas with moderate slopes on all aspects are most suitable for caribou during this period. Caribou are often located on ridge tops or upper slopes with open, old-growth forests. Lichen is abundant and easily available as the high snow pack lifts the caribou up to 5 m into the canopy. Avalanche hazards are also low in these areas because of the moderate slopes (Simpson et al. 1985).

In spring, caribou move to areas that are "greening up". The greatest variation in habitat selection between the Selkirk caribou and other mountain caribou populations occurs at this time. Revelstoke caribou descend to valley bottoms in late April when the snow has generally left these sites and select small forest openings where succulent new vegetation is available (Simpson and Woods 1987). The Selkirk caribou remain at mid-elevation where they use open-canopied areas often adjacent to mature forest (Scott and Servheen 1985, Servheen and Lyon 1989). These areas provide high quality forage early in spring, allowing caribou to recover from the effects of winter.

Pregnant females move to typical spring habitat in April or May, then move back onto snow-covered areas often at higher elevations to calve in early June. This behavior may function to avoid predators and therefore increase calf survival (Edwards and Ritcey 1959, Bergerud et al. 1984, Simpson et al. 1985, Servheen



and Lyon 1989). The areas selected for calving by Selkirk caribou typically support old noncommercial forests with high lichen densities, open canopies, and small trees. The areas also have lower road densities than caribou habitats used throughout the rest of the year. Lichen again becomes the primary food source because green forage is unavailable at these elevations in early June (Servheen and Lyon 1989).

As snow melts from the remainder of the available habitat, caribou bulls and immature animals return to higher elevations. They spend the summer in the alpine and subalpine vegetative zones primarily in areas of high forage availability. In early summer, open-canopied stands provide an abundance of forbs and huckleberry (Vaccinium spp.) leaves (Scott and Servheen 1985), and as summer progresses the caribou move to more closed-canopy forest stands supporting forbs that mature later in the season (Servheen and Lyon 1989). Selkirk caribou use the most moderate slopes during this season, spending much of their time on benches and in the riparian zones of secondary streams. Summer range includes the western cedar/western hemlock and the Engelmann spruce/sub-alpine fir zones at an average elevation of 1700 m (5,600 ft) in the southern Selkirks (Servheen and Lyon 1989), and from 1400 to 1600 m (4,600 to 5,300 ft) in the Revelstoke area (Simpson and Woods 1987).

The gradual movement from summer to fall habitat may occur as a result of early frost effects on vascular forage. Caribou shift to lower elevations and more densely canopied forest in the

southern Selkirks. Western hemlock habitats with high snag densities are used extensively during this season (Servheen and Lyon 1989). The importance of snags is probably related to the availability of windthrown trees and deadfalls that increase lichen availability. Habitat selection during this period focuses on vascular plant availability and increasing amounts of lichen as winter nears and the annual cycle repeats.

#### **E. Life History/Ecology**

The following description of woodland caribou life history was extracted from Anderson (1971), Banfield (1961), Bergerud (1971, 1974, 1978a, 1978b, 1980, 1983), Bergerud et al. (1983, 1984), Compton et al. (1990), Cringan (1957), Edwards (1954), Edwards and Ritcey (1959, 1960), Espmark (1971), Fashingbauer (1965), Johnson (1985), Johnson and Miller (1979), Leader-Williams (1988), Peterson (1966), Rominger and Oldemeyer (1990), Scott (1985), Scott and Servheen (1985), Seip (1990), Servheen (1989), Servheen and Lyon (1989), Trainer (1973), and U.S. Fish and Wildlife Service (USFWS 1985).

Caribou generally have a low reproductive rate. The maximum intrinsic rate of increase ( $r$ ) is estimated to be 0.30. Females usually give birth to their first calf when they are 3 years old. Single calves are the norm. Generally, over 75% of adult ( $\geq 3$  years old) females are pregnant in typical caribou populations. Although Selkirk caribou pregnancy rates are unknown, they are probably similar. Gestation is 227-229 days, and calves are born

in May or June. Pregnant females seek high elevation ridges to calve, possibly as an anti-predator strategy. Calf mortality during the first few months of life is high, many times approaching 50% or greater. Causes of calf mortality include inclement weather, predation, abandonment, and accidents. Neonatal mortality rates for the Selkirk caribou have not been determined because of small sample sizes and logistical difficulties, but are also believed to be high. Calves generally make up 27-30% of the population at birth, but by recruitment age (1 year old), their proportion is generally less than 20%. Populations are considered stable when calves make up 10-17% of April composition counts, while higher or lower proportions indicate increasing or decreasing populations, respectively. Information gathered during 1983-85 indicated the Selkirk population was either stable or slightly declining. Composition counts were not conducted during 1986-90, but resumed in 1991. Recent estimates indicate the population remains stable.

Although specific data for the Selkirks is not available, females generally live 10-15 years and males 8-12 years in unhunted populations. Adult survival rates average from 87 to 93%. Survival of transplanted Selkirk caribou has ranged from 56% to 81% during 1987-92. Causes of mortality among resident (Fig. 2) and translocated (Fig. 3) Selkirk caribou include natural (as evidenced by poor body condition), predation, poaching, accidental, motor vehicle collisions, and unknown.

Several patterns are noteworthy when comparing historical

mortality to that of translocated animals. Most known mortality continues to occur in late summer and fall. Hunting-related mortalities appear to have declined, perhaps due to the high profile of caribou, their status, and extensive education and enforcement efforts. Most hunting-related mortality was before 1985. Natural and unknown (but likely natural) causes are the primary mortality factors today. Vehicle collisions have also declined markedly, though the potential remains. Most vehicle collisions occurred before 1985.

Factors possibly limiting woodland caribou populations include habitat modification and fragmentation, overharvest (or poaching), disease, and predation.

Selkirk caribou are polygamous with adult males defending harems of 6-10 cows with calves. Breeding season is unusually short and peaks during early-mid October. After the rut, adult males generally segregate themselves and remain so throughout the year.

Unlike the more familiar barren ground caribou, woodland caribou usually remain in relatively small, incohesive groups. In the Selkirks, group size ranges from single females during calving season to groups of approximately 25 during late winter. The largest group sizes are encountered during rut and late winter, whereas spring and summer groups are generally small (2-5 individuals).

The food habits of woodland caribou are unique in the deer family. Although caribou eat a wide range of foods, winter

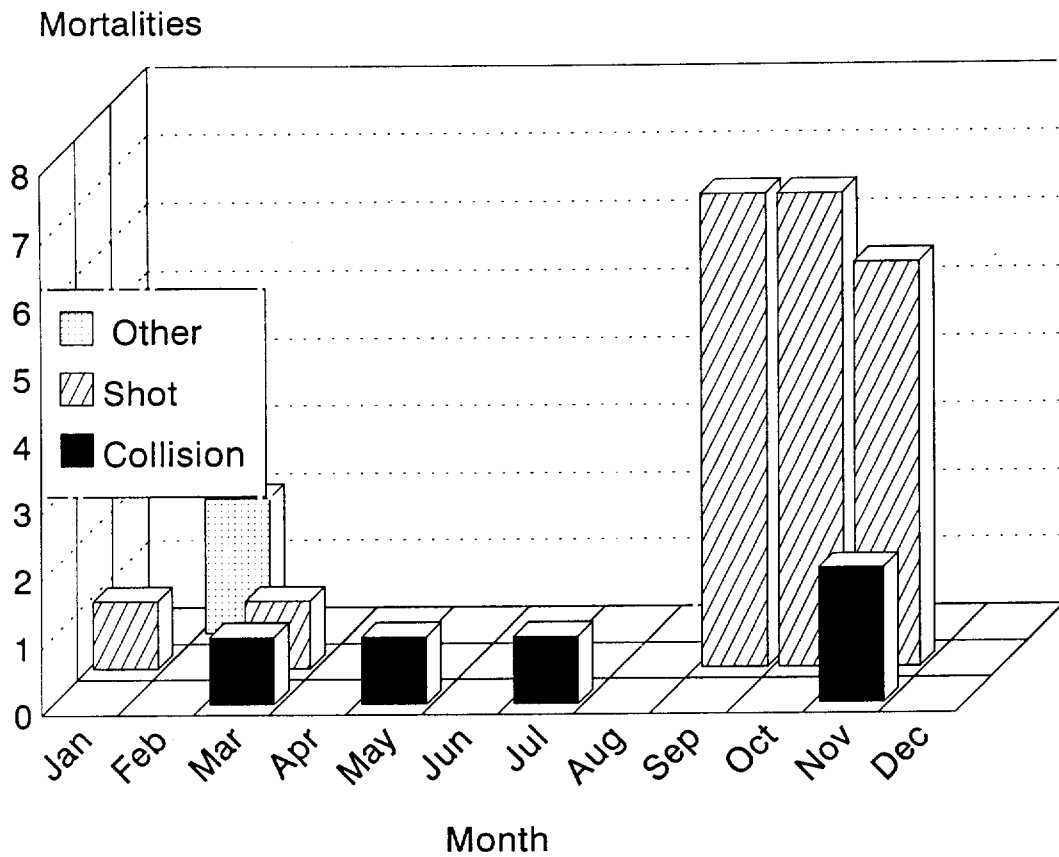


Figure 2. Known mortality of resident Selkirk caribou, 1967-90, based on historical records and accounts. This does not include radio-collared animals used to augment the resident population.

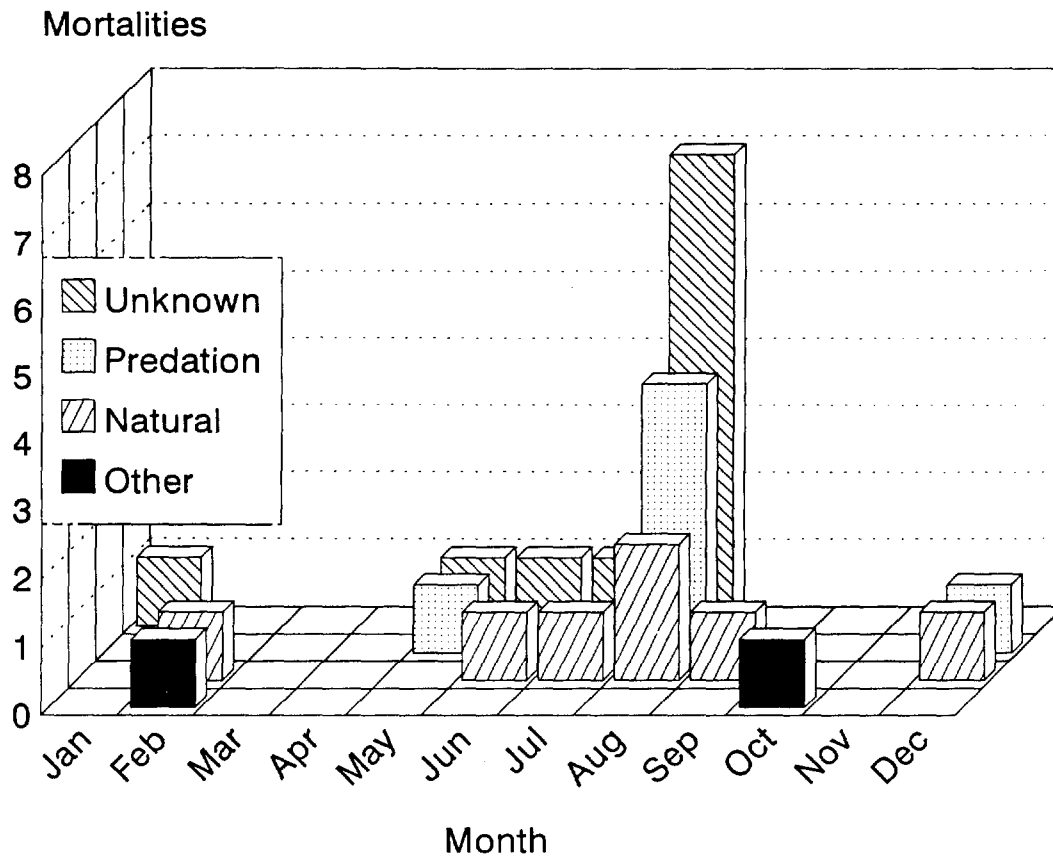


Figure 3. Mortality patterns for radio-collared caribou used to augment the resident herd, March 1987 to September 1990 (Compton et al. 1991). "Other" causes include poaching (1) and accidental (1).

foraging is limited almost exclusively to arboreal lichens (Alectoria spp. and Bryoria spp.). Selkirk caribou generally depend on arboreal lichens for up to 6 months of the year. During the remainder of the year, Selkirk caribou feed extensively on huckleberry leaves, Sitka valerian (Valeriana sitchensis), boxwood (Pachistima myrsinites), and smooth woodrush (Luzula hitchcockii).

#### F. Reasons For Listing

Past management of Selkirk caribou was reviewed by Flinn (1956), Layser (1974), and U.S. Fish and Wildlife Service (USFWS 1985). In 1980, the USFWS received a petition from a private citizen and another from the Idaho Department of Fish and Game requesting assessment and listing of these caribou under the Endangered Species Act (Act). On January 14, 1983 the Secretary of the Interior listed the Selkirk population as endangered under an emergency rule. The rule expired on September 12, 1983. A second emergency rule was published October 25, 1983 and the final rule published February 29, 1984. Listing the population under the Act means that all federal actions or activities that might affect caribou (e.g., timber sales, road building, recreation activity, mineral leases) must be reviewed by the USFWS. The USFWS determines whether the proposed federal action would jeopardize caribou survival.

In the 1800s, caribou were more plentiful than today in the mountains of northeastern Washington, northern Idaho, northwestern Montana, and adjacent parts of southwestern B.C. The status of

the southern Selkirk population was not clear until the mid-1980s when telemetry work and other surveys began. However, estimates by Flinn (1956) and Evans (1960) of about 100 individuals during the 1950s seem reasonable. The population continued to decline until researchers counted only 26 caribou in 1983. Before augmentation, the population probably contained about 30 individuals (Federal Register 49:7390-7394).

These caribou are ranked among the most critically endangered mammals in the U.S. Additional losses could be disastrous, and the potential for such losses is great. Illegal killing occurs; one caribou was shot in Canada in October 1983, one was poached in Washington in 1988, one was killed west of Sandpoint, ID in 1990, and two more were killed in the U.S. portion of the Selkirks in 1992. Also, poachers killed at least one animal from this population in 1980, 1981, and 1982. The problem is greatest where the caribou frequent areas with good road access. Because there are more roads in the U.S. portion of the herd's range, the potential for illegal harvest is greater there. Also, licensed deer and elk hunters may accidentally shoot caribou. Therefore, access management, hunter education, and law enforcement are important recovery activities. Although access is already managed to some degree, roads continue to be constructed in caribou range allowing greater access and setting up possible illegal harvest. Disease is not known to significantly impact these caribou.

Furthermore, research conducted in the late 1980s shows that



the effects of predation on caribou populations may be more significant than once thought (Compton et al. 1990, McCullough 1990, Seip 1990). Mountain lions (*Felis concolor*), bears (*Ursus* spp.), and coyote (*Canis latrans*) occur in the range of the Selkirk caribou. Wolf (*Canis lupus*) and grizzly bear management (both on the U.S. List of Endangered and Threatened Wildlife) could affect the Selkirk caribou population as well.

Habitat alteration also continues. Timber harvest alters caribou habitat and creates additional access which increases potential for mortality. Logging can potentially affect caribou habitat by eliminating escape (security) cover, migration corridors, and lichen production. Although food availability is probably not now limiting this caribou population, long-term population survival will partially depend on adequate lichen production and availability. Additionally, timber harvest may alter historic predator and prey densities, thereby exacerbating the predation issue.

Caribou habitat management guidelines developed by an interagency team are used by the U.S. Forest Service, B.C. Ministry of Environment, and Idaho Department of Lands to design timber sales in caribou habitat. These guidelines attempt to minimize the effects of logging on caribou and can be used to develop silvicultural standards that may enhance habitat over the long term. The guidelines are updated as new information becomes available.

To further complicate management, disease and insects (e.g.,

spruce bark beetle (Dendroctonus rufipennis)), affect timber stands in historic caribou habitat. Salvage sales occur and others are planned to remove much of the diseased timber and slow the spread of insects. Although the caribou habitat management guidelines are generally used when designing the sales, studies and monitoring are needed to evaluate the actual caribou and habitat response.

Fire is another phenomenon in the range of the caribou, and in the past has destroyed caribou cover and winter food (Salmo Basin 1919, Sundance 1967, and Trapper Peak 1967). The cumulative effects of logging, fire, and other phenomena have eliminated a great deal of the herd's historic habitat.

Less natural are the collisions with vehicles that kill caribou along Trans-Canada Highway No. 3 at Salmo-Creston Summit, about 8 km (5 miles) north of the international boundary. Although no highways exist in the U.S. portion of the population's primary habitat, there is a potential for caribou-vehicle collisions on U.S. Forest Service roads used by loggers, miners, and recreationists. As the number of forest roads and subsequent traffic increases, the threat of such collisions will increase. Johnson (1976) suggested that a single accident along an icy winter road where the caribou have gathered to feed on salt, could wipe out a significant part of the herd.

Recovery action items (Part II) address caribou population limiting factors. Expeditious implementation of these recovery tasks should recover the Selkirk caribou.

## G. Conservation Actions

Measures implemented for the conservation of Selkirk caribou fit logically into 2 time periods: those occurring before the caribou were listed as an endangered population in 1983, and those taking place since then under the guidance of the Selkirk Mountain Caribou Management/Recovery Plan (USFWS 1985).

### Conservation Actions Prior To Listing

In 1971, federal, state, and Canadian resource management agencies within the range of the Selkirk caribou signed a cooperative agreement creating an International Caribou Steering Committee. This committee (later renamed the International Mountain Caribou Technical Committee) was charged with coordinating studies on the caribou population and promoting management activities to reverse the population decline.

The cooperative agreement produced a series of population and habitat studies in the 1970s. Freddy (1974) estimated the population consisted of about 25 animals and mapped its general range. Stevenson (1979) assessed arboreal lichen production in southern B.C., and a series of smaller research projects was initiated during this period (Johnson and Miller 1979, VanDaele and Johnson 1983). Most of these studies pointed toward the need for reduced or modified timber harvest in caribou habitat.

In 1977, recommendations were consolidated into Guidelines for Human Activity within the Range of Mountain Caribou, Southern Selkirk Mountains (Johnson et al. 1977), updated in 1981 (Johnson et al. 1981) and again in 1986 (USFS 1986). The U.S. Forest

Service adopted the guidelines as a blueprint to manage caribou and timber harvest.

Also in 1977, the Idaho Fish and Game Commission listed caribou as a threatened or endangered species in the state, followed by a similar listing in Washington in 1982. Idaho petitioned the USFWS for a status review of Selkirk caribou in 1980.

In 1982, the Idaho Department of Fish and Game initiated a 3-year study of caribou status, distribution, and habitat requirements (Scott and Servheen 1985), and members of the International Mountain Caribou Technical Committee began preparing the Selkirk Mountain Caribou Management Plan. The USFWS adopted a revised version of this document in 1985 as the recovery plan for the species (USFWS 1985).

#### Conservation Actions Following Listing

Federal listing under the Endangered Species Act stimulated interest and additional funding for the conservation of Selkirk caribou. As a result of the first recovery plan, a recovery zone was delineated which includes seasonally important habitats (Table 1 and Appendix A). Conservation measures included better interagency coordination, research, habitat protection, law enforcement, population augmentation, and information and education programs.

Interagency coordination - The Selkirk caribou range encompasses many jurisdictions. Cooperation among the federal, state, provincial, and private organizations involved in management of

the herd has been the hallmark of caribou recovery efforts in the Selkirks. Government agencies actively involved in this effort include the B.C. Forest Service, B.C. Ministry of Environment - Wildlife Branch, Idaho Department of Fish and Game, Idaho Department of Lands, U.S. Forest Service, U.S. Fish and Wildlife Service, University of Idaho, Washington Department of Wildlife, and Washington State University. Industry, sportsmen, and environmental groups are also key participants.

Management and research activities of these organizations are coordinated through the International Mountain Caribou Technical Committee (IMCTC). IMCTC activities are directed by the Caribou Steering Committee, a group of upper level agency managers formed to guide policy direction and facilitate funding of caribou recovery efforts.

Research - During the past decade, significant progress has been made toward understanding the ecology of mountain caribou in the southern Selkirk Mountains. Scott and Servheen (1985) studied the population characteristics and distribution of the resident caribou population in northern Idaho and southern B.C. and determined their seasonal habitat preferences. Servheen and Lyon (1989) further described habitat use. Detrick (1985) quantified the arboreal lichens available to caribou, while Rominger and Oldemeyer (1989, 1990) described caribou early winter habitat and diet. In the late 1980s, research efforts were directed toward evaluating the augmentation program. Servheen (1989), and Compton et al. (1990) documented survival, movements, and habitat

selection of caribou released during the augmentation. These studies were supplemented by graduate student research (Warren 1990, Allen-Johnson in prep.). Chesser et al. (in prep.) investigated the population genetics of Selkirk caribou and compared them to other caribou populations.

Habitat protection - Delineation of potential caribou habitat on National Forest, state, private, and Canadian lands in the Selkirk ecosystem is based on Scott and Servheen (1985) (Table 2).

Table 2. Caribou habitat in the Selkirk ecosystem<sup>1</sup>.

Jurisdiction	Hectares	Acres
Idaho Panhandle National Forest	70,778	174,760
Colville National Forest	31,185	77,000
State of Idaho lands	20,813	51,390
Kootenay Lake Forest Dist. (B.C.)	29,337	72,437
Arrow Forest District (B.C.)	2,565	6,333
Stagleap Provincial Park (B.C.)	1,194	2,948
Private (U.S.)	11,340	28,000
Private (B.C.)	12,349	30,492
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TOTAL	179,561	443,360

<sup>1</sup> Table depicts ownership only -- not all of these acres are suitable habitat.

National Forest habitats were allocated to caribou

management in the Idaho Panhandle (USFS 1987) and Colville (USFS 1988) forest plans. Vegetation management guidelines supplementing Johnson et al. (1981) were developed for management on these allocated lands (USFS 1986), and wildlife biologists are directly involved in applying them to management activities such as proposed timber harvest. Within an adaptive resource management context, experimental approaches to timber harvest, intended to maintain or enhance lichen production, are being tested and evaluated on National Forests and Canadian timberlands. Summerfield (1985a) developed a draft model for assessing the cumulative effects of timber harvest and other activities on caribou habitat.

Law enforcement - Illegal shooting by poachers and hunters who mistakenly identify caribou for other game animals has been an important source of mortality for Selkirk caribou (USFWS 1985). Through the early 1980s, 1-2 caribou were lost annually to this cause, primarily in B.C. Illegal mortality may have declined after caribou were protected by the Endangered Species Act. Coordinated enforcement efforts by federal, state, and Canadian agencies has resulted in successful prosecution of some offenders. One poaching case involving a transplanted caribou killed in Washington in 1988 is under investigation, and 1 case in Idaho in 1990 was successfully prosecuted. Two more were killed in Idaho in 1992. Investigations are underway.

Preventing illegal mortality has been a high priority in the Selkirks. Motor vehicle use is restricted on many forest roads in

the U.S., reducing caribou vulnerability to human-caused mortality. These restrictions also provide security for grizzly bears (a threatened species) and big game, and protect watersheds.

In 1984, part of the caribou range in southern B.C. was closed to all big game hunting in an effort to reduce illegal shooting of caribou. In addition, the National Audubon Society established a reward system as a deterrent to caribou poaching. A reward was paid in 1 case thus far.

Population augmentation - After the agencies, through IMCTC, proposed population augmentation to assist recovery, an augmentation plan (Summerfield 1985b) and environmental assessment (Summerfield 1985c) were prepared. Potential caribou acquisition sites in B.C. were identified, and a total of 24 caribou were moved from Revelstoke and Anahim Lake, B.C. to Ball Creek, Idaho in early 1987. A year later, a nearly identical operation provided an additional 24 caribou. Weather conditions precluded transplanting caribou in 1989, but 12 more were transported from Blue River, B.C. to Ball Creek in 1990.

The success of the augmentation program has not yet been fully evaluated, but movements, habitat selection, natality, and mortality of the transplanted caribou continue to be monitored (Servheen 1989, Compton et al. 1990, Warren 1990). Details of the transplant operation can be found in Servheen (1989) and Compton et al. (1990).

Public information and education - Information and education efforts on behalf of Selkirk caribou have been varied and



extensive. Much of this effort has been coordinated through IMCTC. "We Care About Caribou" posters and brochures were distributed widely to popular markets. Signs warning hunters of caribou presence have been routinely posted in caribou habitat in Idaho, Washington, and B.C. for several years. Caribou identification pocket cards have been distributed by the agencies. The USFS and IDFG developed a slide series and video "Ghosts of the Selkirks", describing the ecology and management of the herd. Additionally, information booths have been provided at sportsman shows.

Numerous articles about Selkirk caribou have appeared in popular magazines and newspapers. IDFG has included segments about the herd in its TV program "Outdoor Idaho".

Biologists active in caribou management have given many presentations in local communities to children and adult audiences. A very successful "Adopt a Caribou" program was implemented by IDFG and later adopted by the Washington Department of Wildlife. School children as far away as New York City, and across the northwest have "adopted" 1 of the transplanted caribou and decorated its radio collar. They then called a toll free number to receive reports on their adopted animals' activities.

#### **H. Strategy of Recovery**

The main thrust of the recovery effort is to maintain the existing 2 herds in the Selkirk Ecosystem and to establish a 3rd herd in Washington State; to secure and manage at least 179,000 ha (443,000 acres) of suitable and potential habitat in the Selkirks

to support a self-sustaining population. The projected size of a recovered population will be determined after thorough population modeling.

Pending environmental analysis, the existing herds will be augmented with mountain caribou from B.C. translocated to the western portion of the Selkirk Mountains ecosystem in Washington. Methods will follow those outlined by Summerfield (1985b).

## PART II. RECOVERY

### A. Interim Objectives and Criteria

One of the great frustrations in developing management plans for a threatened or endangered species is that, in general, adequate ecological data are not available. Furthermore, because the species in question are threatened or endangered, and presumably declining, conservation measures cannot be postponed until appropriate data are available. To many observers, population and habitat modeling is the panacea. But modeling is an inexact science that hungers for data. As with most wildlife research, these data accumulate slowly and are difficult and expensive to collect. Therefore, interim plans are developed that provide for an increasing population and improving habitat conditions. Very specific recovery goals (e.g., population size) would be inappropriate because they would represent nothing more than a guess.

This plan and the recovery objectives are based on the best available information and the collective judgement of a group of managers and biologists. Because there are so many unknowns in the process, it is imperative that such an approach be accompanied by a monitoring program that will demonstrate the efficacy, or lack thereof, of the management plan. Based on this monitoring, the recovery plan is modified as appropriate, and eventually evolves into a biologically sound document with specific objectives that will ensure population viability and sustainability.

This adaptive resource management approach was formally presented by Walters (1986) and is the basic premise for several other recovery plans and conservation strategies (e.g., Thomas et al. 1990, USFWS 1992). Adaptive resource management is a common sense approach by which we can improve management practices by implementing plans and monitoring in ways that maximize the opportunities to learn. It can provide a reliable means for testing and improving a conservation strategy.

The ultimate goal of this recovery process is a self-sustaining population of caribou that is well-distributed throughout the Selkirk ecosystem. However, data are not available to establish specific, long-term recovery goals and objectives. Therefore, the primary goal of this plan is to increase caribou populations and habitat suitability until specific population and habitat criteria can be established and full recovery goals enumerated. Specifically, the objectives are to:

1. Maintain the 2 existing caribou herds in the Selkirk Ecosystem.

2. Establish a herd in the western portion of the Selkirk Mountains in Washington.
3. Maintain an increasing population as reflected by March aerial surveys (i.e.,  $r > 1$ ).
4. Secure and enhance at least 179,000 ha (443,000 acres) of suitable and potential caribou habitat in the Selkirks to support a self-sustaining population.

Only professionally credible, peer-reviewed data will be used to develop more specific recovery objectives. The Interagency Mountain Caribou Technical Committee will serve as a clearinghouse for these data.

## **B. Narrative**

### **1. Maintain the population.**

Although information is limited, it appears that human-caused mortalities were instrumental in the initial decline of Selkirk caribou. The population decline appears to have coincided with increasing settlement and exploration but before widespread habitat modification (Layser 1974, Evans 1960). Human-related mortalities continue to threaten caribou recovery. Emphasis should be placed on preventing vehicle-caribou collisions on B.C. Highway 3, shooting deaths resulting from misidentification during hunting seasons, and purposeful poaching.

#### **11. Reduce the impacts of poaching and accidental kills by hunters.**

##### **111. Promote anti-poaching campaigns.**

Cooperating agencies and private organizations will pool resources to build and maintain a reward fund to help catch and convict poachers and prevent illegal caribou shootings. Toll-free hotlines; posters; and news articles in newspapers, magazines, and on television will advertise these funds. Active cooperative law enforcement patrols and investigations will be pursued.

##### **1111. Develop plan to promote anti-poaching campaigns.**

The informal plan that has been in place for 2 years will serve as a starting point for a more formal plan.

##### **1112. The plan will be implemented upon completion.**

112. Prevent accidental hunter kills.

Idaho, Washington, and B.C. have hunting seasons in caribou-occupied areas. Most critical are September and early October when ungulate and caribou ranges may overlap and snow does not limit hunter access. A conservative goal at this point, before population modeling is complete, is zero hunting-related mortality. Posters, brochures, and programs to reduce accidental caribou shootings are useful. Information and education programs in Idaho and Washington promote caribou identification and methods of distinguishing them from deer and elk. Changes in access management and hunting restrictions will be implemented when deemed necessary.

1121. An outreach plan will be developed by information and education specialists from cooperating agencies.

1122. Implement the plan.

1123. A plan will be developed to address hunting-related mortalities.

1124. Implement the plan.

12. Reduce the impacts of caribou-vehicle collisions.

Since its completion in 1963, B.C. Highway 3 has been a threat to caribou because it runs directly through the extant caribou core use area defined by Scott and Servheen (1985). Caribou cross and loiter along the road at all times of the year. Warning signs and electronic billboards erected on either side of Salmo-Creston Summit currently help reduce vehicle speeds and increase driver awareness of caribou. Efforts will be increased to reduce availability of road salt to caribou, thus alternatives to winter salting will be explored. Establishing concrete guardrails along caribou use and crossing areas may exacerbate the highway-caribou problem. Efforts to lower caribou-vehicle collisions are critical.

121. Identify the specific sources of mortality.

Currently, B.C. Highway 3 is the only known source of this type of mortality, but mortality locations and causes need to be identified more specifically.

122. Develop a plan that will include information regarding alternatives to road salting.

123. Implement the plan.

13. Reduce the impacts from other sources of mortality.

Using radio-collared caribou, we are currently striving to identify additional caribou mortality factors.

131. Identify the sources of mortality by monitoring the radio-collared caribou.

132. Develop a plan to address the additional sources of mortality.

133. Implement the plan.

14. Reduce population impacts due to genetic and demographic influences.

141. A plan addressing genetic and demographic influences was completed in 1985

(Summerfield 1985b, 1985c; USFWS 1985).

142. The plan has been implemented.

A total of 60 caribou from 3 B.C. locations were released in north Idaho during 1987, 1988 and 1990 in an effort to prevent extinction of the Selkirk herd, increase its reproductive potential, reduce potential deleterious effects of inbreeding, and speed recovery. The transplanted caribou have bred and reproduced in the Selkirks. No transplant-related mortalities appear to have occurred after release, but predation by bears and mountain lions, natural, human-caused, and unclassified causes of mortality have limited population increases. Further monitoring will determine the overall success of the project. Future transplants and transplant areas will be required for full recovery. Additional methods should also be evaluated to increase caribou numbers.

2. Secure and manage at least 179,000 ha (443,000 acres) of habitat in the Selkirks to support a self-sustaining caribou population.

Conservation of caribou habitat is vital to the recovery of the Selkirk caribou. Caribou in the Selkirks use specific seasonal habitats (Stevenson and Hatler 1985, Servheen and Scott 1985,

Rominger and Oldemeyer 1989, Servheen and Lyon 1989, Simpson and Woods 1987, Antifeau 1987). Conservation of these habitats and their juxtaposition is an important element of caribou recovery. As research better defines these habitats, they must be maintained and enhanced to support Selkirk caribou at recovery levels. All activities in caribou habitat should be evaluated (as required on U.S Federal lands) within the context of our current knowledge. Activities that may adversely affect caribou and/or their habitat should not be permitted.

21. Protect, enhance, and restore Selkirk caribou habitat.

Any habitat losses are especially significant now that caribou habitat is becoming more restricted with continued land development. Though considerable research remains to be conducted, we cannot afford additional habitat losses. Therefore, guidelines based on currently available information will be used. These guidelines will be updated as new information becomes available. Furthermore, an interagency team will be assembled to develop management standards for activities that will protect and enhance caribou habitat.

211. Inventory caribou habitat.

Preliminary inventory of caribou habitat has been completed on USFS lands and portions of IDL and BCFS lands. The remaining habitat needs to be inventoried and the entire inventory should be updated as habitat information is refined. Standardized map scales, habitat components, and map units should be used to delineate seasonal habitats.

212. Determine caribou habitat capability.

We need to assess habitat capability and relate it to caribou demographics. Habitat management guidelines can probably be used to index current habitat capability and project future capability.

213. Reduce the impacts of fire on caribou habitat.

Fire is an integral part of the Selkirk ecosystem and has consumed large blocks of caribou habitat over the last 30 years. This has put additional pressure on unaffected habitat to support caribou recovery and other multiple use needs. The fire cycle impact needs to be assessed as it relates to caribou, and methods for fire protection and control need to be improved. An interagency assessment team will be assembled.

2131. Evaluate the potential for wildfire in Selkirk caribou habitat.

2132. Develop management prescriptions.

Work with the land managers to develop fire management prescriptions that emphasize restricting fires to small areas that will not restrict caribou movement or habitat use.

2133. Implement the prescriptions.

These will be reviewed and updated at least once every 2 years.

214. Reduce the impacts of insects and diseases.

The spruce bark beetle was the initial cause for accelerated timber harvest in the Selkirks beginning in the 1950s. Control of this insect would alleviate the impacts of timber harvest on caribou habitat. It is likely that other insects or diseases will become important factors in the future. An interagency team will be assembled to:

2141. Determine the potential for habitat loss to insects and disease.

2142. Develop prescriptions to control insects and disease that consider silvicultural and other options and do not adversely affect caribou habitat.

2143. Implement the prescriptions, and review and update once every two years.

215. Reduce the impacts of timber management on caribou and their habitat.

The effects of timber harvest must be considered when evaluating the maintenance and enhancement of caribou habitat. There is strong evidence that certain harvest regimes have detrimental effects on caribou habitat. Based on Scott and Servheen (1985) and Simpson and Woods (1987), caribou habitat guidelines were developed by an interagency team for the USFS. These guidelines were a refinement of those developed by Johnson et al. (1981). These guidelines should be periodically updated as better data become available. An interagency team has been established.



2151. Refine the caribou habitat management guidelines using the most recent data.

2152. Develop standards for timber management that will be incorporated in the Forest Plans to maintain and enhance caribou habitat.

2153. Implement the guidelines and standards. The guidelines are currently being refined. They should be implemented immediately upon completion. Standards will be implemented through Forest Plan amendments as soon as they are available. They will be reviewed and revised as needed.

216. Reduce or eliminate the impacts of recreational activity on caribou and their habitat.

Uncontrolled or inappropriate recreational activity may have detrimental effects on caribou and their habitat. For instance, snowmobile use in winter habitats or ORV use during snow-free seasons may displace caribou from important habitats. This will become an even more significant problem as recreational use increases and the caribou herds grow. An interagency team will be assembled to:

2161. Develop standards pertaining to recreational activity in caribou habitat.

This group will rely heavily on research and management experiences from Revelstoke, B.C., where snowmobile/caribou conflicts have apparently been resolved.

2162. Implement the prescriptions as soon as they are ready.

The prescriptions will be reviewed and revised once every 2 years.

22. Manage appropriate habitats.

221. Establish recovery zone boundary.

A recovery zone boundary has been established and was presented in the original recovery plan. A parcel was inadvertently omitted from the original plan, but is now included. This parcel includes habitat south of Hall Mountain extending to the southern slopes of Molybdenite Mountain at an elevation generally above 1,200 m (4,000 feet) on the Sullivan Lake Ranger

District of the Colville National Forest.

222. Delineate boundaries for Caribou Management Units (CMUs).

An interagency team identified CMUs in mid-1980s for most of the Selkirks. CMUs include all seasonally important habitats and provide for temporal and spatial distribution of caribou habitats within the recovery zone.

223. A management plan will be developed for each CMU.

The purpose of these plans is habitat protection and improvement.

224. Implement the plans for each CMU.

23. Secure the habitat.

Take advantage of opportunities to place caribou habitat under ESA protection and management.

231. Private lands.

2311. Identify landowners.

Darkwoods Forests, Inc. owns a large portion of Selkirk caribou habitat in B.C., and Plum Creek Timberlands and WI Forest Products own some of the U.S. habitat.

2312. Develop cooperative agreements with landowners.

Accepted guidelines and standards will be provided to private entities in the U.S. These entities will be encouraged to assist with recovery through development of Habitat Conservation Plans under Section 10 of the ESA. In any event, provisions of Section 9 of the ESA apply to private lands in the U.S.

2313. Secure the habitat.

Opportunities will be pursued with willing state or private entities for land exchange or purchase. Agreements with state or private entities will be developed to protect or enhance caribou habitat.

232. Public land.

Most of the caribou habitat in the U.S. is managed by the USFS. This agency is obligated under Section 7(a)(1) of the ESA to manage this habitat for the conservation of caribou. Inherent within this obligation is to promote recovery and eventually delist the species. The IDL, B.C. Forest Service, and B.C Parks also own or manage caribou habitat but are under little obligation to manage habitat for caribou recovery. The government of B.C. is reviewing its protected area system and expects to provide for biological preservation. Habitat occupied by Selkirk caribou has been recommended for consideration as protected area and a portion of the unoccupied Selkirk caribou habitat is officially designated as a "study area" for protection.

2321. Develop a plan.

This may include MOUs and other agreements.

2322. Implement the plan.

233. Secure essential habitat on public lands.

Critical habitat designation will improve habitat protection only on Federal lands. It does not place constraints on private lands. The USFWS must announce through the Federal Register notice, an intent to designate critical habitat, identify what areas should be critical habitat, consider economic effects, and hold public hearings. After this process is completed, final designation will need to be published in the Federal Register.

234. Review ecosystem approach for recovery of several species.

The Selkirks are home to several species protected under the ESA. Caribou, grizzly bears, bald eagles, peregrine falcons, and gray wolves occur in the Selkirks. Developing recovery plans for individual species in the Selkirks is inefficient and plans may work against one another. One plan integrating all listed species may be a better approach. Therefore, an "ecosystem recovery plan" approach will be considered. Authority to prepare such a plan in lieu of individual species recovery plans may require policy changes or legislative action.

3. Gather information needed for recovery actions (verify recovery objectives).

31. Habitat research needs.

311. Determine caribou habitat relations.

Although much has been learned about caribou habitat and habitat use, many unanswered questions remain. Caribou have several unique habitat needs, including use of windthrown trees as a source of lichen forage, dense canopies to intercept snow in early winter habitats (Rominger and Oldemyer 1989), and high elevation isolated ridges by pregnant females during calving as a predator avoidance behavior (Bergerud and Page 1987, and Simpson and Woods 1987). However, more refined data are needed to determine the factors limiting caribou habitat suitability.

3111. Identify seasonal habitat preferences for caribou.

Our current understanding of caribou seasonal habitat preferences is inadequate. Research in the Selkirks and elsewhere is providing data to fill this void. The new information is directly related to USFS and IDL stand and management data.

3112. Determine habitat components and interspersions necessary for caribou.

For recovery, caribou in the Selkirks must be distributed over a wider area than at present. The correct mix or interspersions of seasonal habitats will be important to recovering and maintaining caribou in the Selkirks.

3113. Determine seasonally important food items.

Arboreal lichens are a primary food item of Selkirk caribou in early and late winter (Scott and Servheen 1985, Rominger and Oldemeyer 1990). During snow-free seasons, caribou use vascular plants including forbs and shrub leaves. More detailed information on preferred seasonal food items is needed.

3114. Determine lichen ecology.

Abundance and distribution of arboreal lichens

are important factors affecting the quality of caribou winter habitats. Lichen availability may limit caribou recovery. Additionally, the slow growth of lichen and its association with older timber stands may bring it into direct conflict with timber production. Factors affecting lichen distribution, abundance, and growth rates will be determined.

31141. Determine species of lichen most important to caribou.

One empirical study to determine which lichen species are most important to caribou is underway in B.C. Additional research will be considered.

31142. Evaluate methods to sustain or enhance lichen production.

Methods to sustain or enhance lichen production will be evaluated and pursued. These include seeding, fertilization, and timber management. Lichen growth rate studies and the effects of thinning practices on abundance and availability of lichen are currently underway in B.C. (Stevenson, pers. commun.). Further studies will be deferred until information from that work is available.

312. Evaluate timber management practices as related to caribou habitat.

Timber management has the greatest influence over caribou habitat in the Selkirk Ecosystem. Emphasis should be placed on silvicultural practices that enhance or restore caribou habitat. Techniques such as uneven-aged management and extended rotations may be necessary to enhance or restore caribou habitat to a desired condition. Caribou habitat falls mostly into 2 forest zones in the Selkirk Mountains: the cedar/hemlock zone and the spruce/fir zone. Uneven-aged management of spruce/fir stands needs to be tested. Regenerating cedar/hemlock types to include components of caribou habitat should also be evaluated.

313. Effects of roads and motorized vehicles on caribou and their habitat.

The influence of automobiles, snowmobiles, motorbikes,

ORVs, and the presence of humans needs to be better understood so that recreational activities in caribou habitats can be properly managed.

314. Develop, implement, and validate the cumulative effects model (CEM).

To evaluate any impact on the animals or their habitat, the cumulative effects of past and future activities must be taken into account. A preliminary CEM was developed by an interagency team in 1985 (Summerfield 1985a). It needs to be updated and tested. An interagency team will:

3141. Develop and/or update the CEM.

The draft CEM will be updated and habitat management guidelines will be integrated for a more efficient model.

3142. Implement the caribou CEM.

The cumulative effects model will be implemented to evaluate effects of past and proposed management activities upon caribou habitat and populations.

3143. Validate the CEM.

Opportunities, including habitat and population monitoring, to validate the caribou cumulative effects model will be evaluated and pursued. This information will then be used to improve the CEM.

32. Population research needs.

321. Develop methodology to economically count and classify caribou.

An unbiased technique to determine caribou distribution, abundance, and population trend is necessary. A methodology is currently being developed and tested (Compton et al. 1992). It will likely be operational in 1994.

322. Determine caribou population trend, structure, and mortality factors.

The caribou population needs to be monitored to evaluate status. The emphasis will be on population trend, recruitment rates, causes and effects of early

calf mortality, effects of human-caused mortality, and other mortality causes.

3221. A monitoring plan will be developed by cooperating agencies to provide data on population trend, recruitment, and mortality rates and causes.

3222. The plan will be implemented and adjusted as necessary.

323. Monitor potential pathogens in caribou and associated species.

White-tailed deer meningeal worms are lethal in caribou, moose, elk and other ungulates. Other parasites and diseases could also have decimating effects on a small recovering population of animals. Monitoring for occurrence of potentially damaging pathogens could give managers the opportunity to avert catastrophic epizootics.

3231. Monitor white-tailed deer populations for occurrence of Parelaphostrongylus tenuis.

Hunter-harvested white-tailed deer will be sampled periodically for occurrence of Parelaphostrongylus tenuis.

3232. Necropsy caribou and other ungulates, found dead, for occurrence of caribou pathogens.

If such pathogens are discovered, take action to prevent their spread and to protect the Selkirk caribou herd. If P. tenuis is discovered in the area or other pathogens pose an imminent threat, appoint a board of pathologists and biologists familiar with caribou and habitat management to assess the situation and determine potential ways to reduce impacts on the caribou.

33. Determine recovery goals and objectives.

331. Determine population size at recovery.

Our understanding of Selkirk caribou population dynamics is currently inadequate to identify a specific point at which the population will become self-sustaining. Presumably, at some time in the past, the Selkirk Mountain caribou population was viable and self-sustaining. Estimates of the population during

the early to mid 1900s range from 50 to 200 (Flinn 1956, Evans 1960, Freddy 1974, Scott 1985, Scott and Servheen 1985), but the population probably was not isolated from other herds at that time. The original Selkirk Mountain Caribou Recovery Plan (1985) suggested a short-term population goal of 109 individuals based on theoretical genetic considerations (USFWS 1985). Analysis of Selkirk population characteristics of the early 1980s indicated that 109 would be needed to provide an "effective population" of 50, which is considered viable, over the short term, for domestic animals where breeding stock can be changed periodically. The number was used only as a reference point at which, "a reevaluation of viable or recovered population size should be made" (USFWS 1985). This short-term goal led to considerable confusion. Although the plan stated that "this target is not assumed to be a recovered population," people interpreted it to mean that once 109 caribou were in the Selkirks, the population could be removed from the Endangered Species List. But those involved with caribou recovery and management believed data were inadequate to designate a specific number at which recovery would be achieved. Therefore, a population assessment based on genetic considerations and population dynamics needs to be done to define caribou recovery and delisting criteria. These population objectives can then be translated to habitat management recommendations.

3311. Gather data to develop a population model for the Selkirk caribou.

Isolated populations, such as the Selkirk herd, may suffer from lower fecundity, higher susceptibility to disease, and higher neonatal mortality rates due to inbreeding (Soule 1980). Tissue and blood samples have been collected from the Selkirk and other caribou herds to compare and detect inbreeding potential. Genetics will be used to determine a theoretically viable population based on variation in allele frequencies, stochastic processes, and population isolation. Using all available information, population modelers will develop a model to estimate the minimum viable population level and the probability of extinction for the Selkirk caribou. Appropriate population data are being collected as part of the Selkirks monitoring effort and elsewhere.



3312. A population model will be developed that will estimate the probability of extinction, sustainable mortality rates, and required population size.

These estimates will be used to set recovery criteria. The model and criteria will be adjusted as new data become available. Interim population goals will include maintaining a positive growth rate (i.e.,  $r > 1$ ) and recruitment greater than 15% (both indicate a growing population).

3313. Determine population size by applying the model.

332. Determine the amount of habitat needed for the recovered population.

Caribou recovery depends on the availability of adequate suitable habitat in the Selkirk ecosystem. Population and habitat models will be developed to determine the amount of habitat required for recovery. This will be done in conjunction with 331.

333. Establish caribou in the western portion of the Selkirks in Washington.

Most of the caribou transplanted in 1987, 1988, and 1990 have remained in the Selkirk ecosystem. Radio-telemetry monitoring of these caribou has shown that, although caribou moved throughout northern Idaho, northeastern Washington, and southeastern B.C., their distribution has concentrated along the Selkirk Crest near the release site and in B.C. in the vicinity of the resident herd's core use area defined by Scott and Servheen (1985). Caribou have made little use of the western portions of the ecosystem. Additional transplants to the western portion of the ecosystem are necessary to achieve better distribution, greater abundance, and enhance the probability of caribou recovery. An interagency team will:

3331. Develop a plan to augment Selkirk caribou by establishing a herd in Washington.

The augmentation plan (Summerfield 1985b) developed for the initial effort will serve as a blueprint.

3332. Implement the plan.

334. Evaluate the need for and feasibility of establishing a population outside of the Selkirk Ecosystem to achieve recovery.

As listed, the endangered Selkirk caribou population includes only those caribou in the Selkirk Ecosystem. There is concern whether a single isolated population can be recovered as specified under the ESA. Population viability is questionable because of potential inbreeding and unpredictable catastrophic events. To maintain long-term population viability, periodic reintroductions of caribou may be necessary to compensate for potential inbreeding. Such a program would require a ready source of caribou for transplant and intrusive population management. For genetic considerations, a second population outside of the Selkirks is desirable. Such a population could be established outside the auspices of the ESA.

4. Keep the public and agency personnel informed and involved in caribou management.

Caribou recovery is an interagency and international effort requiring public support and involvement. Because of the numerous agencies involved and the international aspects of caribou management, it is critical that cooperating agencies maintain contacts at field and supervisory levels. The International Mountain Caribou Technical Committee (IMCTC) should continue to provide information exchange and coordination of caribou recovery efforts. Because caribou are listed as an endangered species, recovery management on USFS lands could potentially have impacts on local and regional economies and communities. It is critical that publics at these levels understand the reasons for and efforts towards caribou recovery. Most importantly, timber industry workers, hunters, recreationists, and other users of caribou areas need to be kept informed of potential impacts. Efforts should be proactive rather than reactive to allow adequate public input and assistance with caribou recovery program efforts.

41. Develop a public involvement plan for activities involving caribou management.

Because of the continual evolution of caribou recovery management and associated impacts, a public involvement plan should be developed to facilitate input and comment. The plan should provide coordinated efforts between all involved agencies.

42. Implement the public involvement plan.

An approved public involvement plan will be implemented to provide for better public cooperation and awareness of caribou recovery efforts.

43. Update the public involvement plan periodically.

The public involvement plan will need to be updated as studies provide new information and management concepts change.

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### III. IMPLEMENTATION SCHEDULE

The Implementation Schedule that follows outlines actions and estimated cost for the Selkirk caribou recovery program. It is a guide for meeting the objectives discussed in Part II of this Plan. This schedule indicates task priority, task numbers, task descriptions, duration of tasks, the responsible agencies, and lastly, estimated costs. These actions, when accomplished, should bring about the recovery of the population and protection of its habitat. It should be noted that the estimated monetary needs for all parties involved in recovery are identified and, therefore, Part III reflects the total estimated financial requirements for attainment of recovery objectives. Some of these tasks are already in place with funding (e.g., prevent and control wildfire) and, therefore, do not require additional funding.

Priorities in Column 1 of the following implementation schedule are assigned as follows:

- Priority 1 - An action that must be taken to prevent extinction or to prevent the population from declining irreversibly.
- Priority 2 - An action that must be taken to prevent a significant decline in species population/habitat quality, or some other significant negative impact short of extinction.
- Priority 3 - All other actions necessary to provide for full recovery of the population.

#### Key to Acronyms used in Implementation Schedule

- BCFS - British Columbia Forest Service
- BCMEWB - British Columbia Ministry of Environment,  
Wildlife Branch
- IDFG - Idaho Department of Fish and Game
- IDL - Idaho Department of Lands
- UI - University of Idaho
- USFS - United States Forest Service
- USFWS - United States Fish and Wildlife Service
- WDW - Washington Department of Wildlife
- WSU - Washington State University

Recovery Plan Implementation Schedule for Selkirk Mountain Woodland Caribou

Priority	Task #	Task description	Task duration (yrs)	Responsible agency	Total cost (\$1000)	FY94	FY95	FY96	FY97	FY98
Need 1 - Population and mortality management										
1	1111	Develop plan to reduce poaching	1	IDFG*	1	1				
				WDW	1	1				
				USFS	1	1				
				USFWS	1	1				
				BCFWB	1	1				
1	1112	Implement the plan	C	IDFG*	TBD		TBD	TBD	TBD	TBD
				WDW	TBD		TBD	TBD	TBD	TBD
				USFS	TBD		TBD	TBD	TBD	TBD
				USFWS	TBD		TBD	TBD	TBD	TBD
				BCFWB	TBD		TBD	TBD	TBD	TBD
1	1121	Develop plan to reduce accidental kills	1	IDFG*	1	1				
				WDW	1	1				
				USFS	1	1				
				USFWS	1	1				
				BCFWB	1	1				
1	1122	Implement the plan	C	IDFG*	TBD		TBD	TBD	TBD	TBD
				WDW	TBD		TBD	TBD	TBD	TBD
				USFS	TBD		TBD	TBD	TBD	TBD
				USFWS	TBD		TBD	TBD	TBD	TBD
				BCFWB	TBD		TBD	TBD	TBD	TBD
1	1123	Develop plan to reduce hunting -related deaths	1	IDFG*	1	1				
				WDW	1	1				
				USFS	1	1				
				USFWS	1	1				
				BCFWB	1	1				
1	1124	Implement the plan	C	IDFG*	TBD		TBD	TBD	TBD	TBD
				WDW	TBD		TBD	TBD	TBD	TBD
				USFS	TBD		TBD	TBD	TBD	TBD
				USFWS	TBD		TBD	TBD	TBD	TBD
				BCFWB	TBD		TBD	TBD	TBD	TBD

Recovery Plan Implementation Schedule for Selkirk Mountain Woodland Caribou

Priority	Task #	Task description	Task duration (yrs)	Responsible agency	Total cost (\$1000)	FY94	FY95	FY96	FY97	FY98
1	121	Identify sources of caribou-vehicle accidents	1	IDFG*	1	1				
				WDW	1	1				
				USFS	1	1				
				USFWS	1	1				
				BCFWB	1	1				
1	122	Develop plan to reduce caribou-vehicle accidents	2	IDFG*	2	1	1			
				WDW	2	1	1			
				USFS	2	1	1			
				USFWS	2	1	1			
				BCFWB	2	1	1			
1	123	Implement the plan	C	IDFG*	TBD			TBD	TBD	TBD
				WDW	TBD			TBD	TBD	TBD
				USFS	TBD			TBD	TBD	TBD
				USFWS	TBD			TBD	TBD	TBD
				BCFWB	TBD			TBD	TBD	TBD
1	131	Identify other mortality sources	C	IDFG*	50	5	5	5	5	5
				WDW	TBD	TBD	TBD			
1	132	Develop plan to address mortality	2	IDFG*	2	1	1			
				WDW	2	1	1			
				USFS	2	1	1			
				USFWS	2	1	1			
				BCFWB	2	1	1			
1	133	Implement the plan	C	IDFG*	TBD			TBD	TBD	TBD
				WDW	TBD			TBD	TBD	TBD
				USFS	TBD			TBD	TBD	TBD
				USFWS	TBD			TBD	TBD	TBD
				BCFWB	TBD			TBD	TBD	TBD
1	322	Population trend & mortality	6	IDFG*	120		20	20	20	20
				WDW	0			0	0	0
1	3331	Develop plan to augment the population	2	WDW*	160	50	80	30		

Recovery Plan Implementation Schedule for Selkirk Mountain Woodland Caribou

Priority	Task #	Task description	Task duration (yrs)	Responsible agency	Total cost (\$1000)	FY94	FY95	FY96	FY97	FY98
1	3332	Implement the plan	2	WDW*	360		100	130	130	
				Need 1 total	730	85	215	185	155	25
Need 2 – Evaluate and secure the habitat										
1	14	Reduce genetic & demographic infl.	As needed	IDFG*	0					
				WDW	0					
				BCFWB	0					
				USFWS	0					
1	2131	Evaluate wildfire potential	C	USFS*	0					
				BCFS	0					
				IDL	0					
1	2132	Develop management prescriptions	C	USFS*	0					
				BCFS	0					
				IDL	0					
1	2133	Implement the prescriptions	C	USFS*	TBD			TBD	TBD	TBD
				BCFS	TBD			TBD	TBD	TBD
				IDL	TBD			TBD	TBD	TBD
1	2141	Evaluate insect and disease potential	C	USFS*	0					
				BCFS	0					
				IDL	0					
1	2142	Develop management prescriptions	C	USFS*	0					
				BCFS	0					
				IDL	0					
1	2143	Implement the prescriptions	C	USFS*	TBD			TBD	TBD	TBD
				BCFS	TBD			TBD	TBD	TBD
				IDL	TBD			TBD	TBD	TBD

Recovery Plan Implementation Schedule for Selkirk Mountain Woodland Caribou

Priority	Task #	Task description	Task duration (yrs)	Responsible agency	Total cost (\$1000)	FY94	FY95	FY96	FY97	FY98
1	2151	Refine habitat management guides	2	USFS*	4	2	2			
				BCFS	4	2	2			
				IDFG	4	2	2			
				WDW	4	2	2			
				IDL	4	2	2			
1	2152	Develop management standards	2	USFS*	20		10	10		
				BCFS	20		10	10		
				IDL	10		5	5		
1	2153	Implement the guidelines	C	USFS	TBD				TBD	TBD
				BCFS	TBD				TBD	TBD
				IDL	TBD				TBD	TBD
1	2161	Develop standards for recreational activity	2	USFS*	5	2.5	2.5			
				USFWS	5	2.5	2.5			
				BCFS	5	2.5	2.5			
1	2162	Implement the prescriptions	C	USFS*	TBD			TBD	TBD	TBD
				USFWS	TBD			TBD	TBD	TBD
				BCFS	TBD			TBD	TBD	TBD
1	2321	Develop plan for public land	3	IDFG	3	1	1	1		
				WDW	3	1	1	1		
				USFS*	15	5	5	5		
				USFWS	3	1	1	1		
				BCFWB	3	1	1	1		
				IDL	0					
1	2322	Implement the plan	C	IDFG*	TBD				TBD	TBD
				WDW	TBD				TBD	TBD
				USFS	TBD				TBD	TBD
				USFWS	TBD				TBD	TBD
				IDL	TBD				TBD	TBD

Recovery Plan Implementation Schedule for Selkirk Mountain Woodland Caribou

Priority	Task #	Task description	Task duration (yrs)	Responsible agency	Total cost (\$1000)	FY94	FY95	FY96	FY97	FY98
1	312	Evaluate timber mgmt	6	IDFG	6		1	1	1	1
				WDW	6		1	1	1	1
				USFS*	90		15	15	15	15
				USFWS	6		1	1	1	1
				BCFS	6		1	1	1	1
				IDL	6		1	1	1	1
1	313	Effects of roads	6	IDFG	24		4	4	4	4
				WDW	12		2	2	2	2
				USFS*	60		10	10	10	10
				USFWS	6		1	1	1	1
				BCFWB	12		2	2	2	2
				IDL	6		1	1	1	1
				Need 2 total	352	26.5	91.5	74	40	40
Need 3 - Habitat management										
2	212	Determine habitat capability	3	IDFG*	90			30	30	30
				WDW	15			5	5	5
				USFS	15			5	5	5
				USFWS	15			5	5	5
				BCFWB	15			5	5	5
2	211	Inventory habitat	3	IDFG	37	10	10	10	1	1
				WDW	27	0	10	10	1	1
				USFS*	159	5	70	70	2	2
				BCFWB	32	5	10	10	1	1
2	221	Establish recovery zone boundary	1	IDFG	1	1				
				WDW	1	1				
				USFS	1	1				
				USFWS	3	3				
				BCFWB*	1	1				
2	222	Delineate CMUs	1	USFS*	1	1				
				USFWS	1	1				
				BCFS	3	3				



Recovery Plan Implementation Schedule for Selkirk Mountain Woodland Caribou

Priority	Task #	Task description	Task duration (yrs)	Responsible agency	Total cost (\$1000)	FY94	FY95	FY96	FY97	FY98
2	223	Develop mgmt plans for CMUs	3	USFS* USFWS BCFS	120 15 15		40 5 5	40 5 5	40 5 5	
2	224	Implement the plans	C	USFS* USFWS BCFS	TBD TBD TBD					TBD TBD TBD
2	2311	Identify private landowners	1	USFS* USFWS BCFS	5 3 2		5 3 2			
2	2312	Develop agreements with private landowners	C	USFS* USFWS BCFS	TBD TBD TBD			TBD TBD TBD	TBD TBD TBD	TBD TBD TBD
2	2313	Secure the habitat	C	USFS* USFWS BCFS	TBD TBD TBD			TBD TBD TBD	TBD TBD TBD	TBD TBD TBD
2	233	Recommend critical habitat designation	3	USFWS*	50	10	30	10		
2	3111	Seasonal habitat preferences	6	WDW IDFG*	70 50		5 15	5 15	15 5	15 5
2	3112	Habitat components & interspers ion	6	WDW IDFG*	70 50		5 15	5 15	15 5	15 5
2	3113	Important forage items	Essentially done	WDW IDFG*	0 0					
2	3141	Develop and/or update CEM	3	IDFG WDW USFS* USFWS BCFWB	15 15 60 15 15			5 5 20 5 5	5 5 20 5 5	5 5 20 5 5

Recovery Plan Implementation Schedule for Selkirk Mountain Woodland Caribou

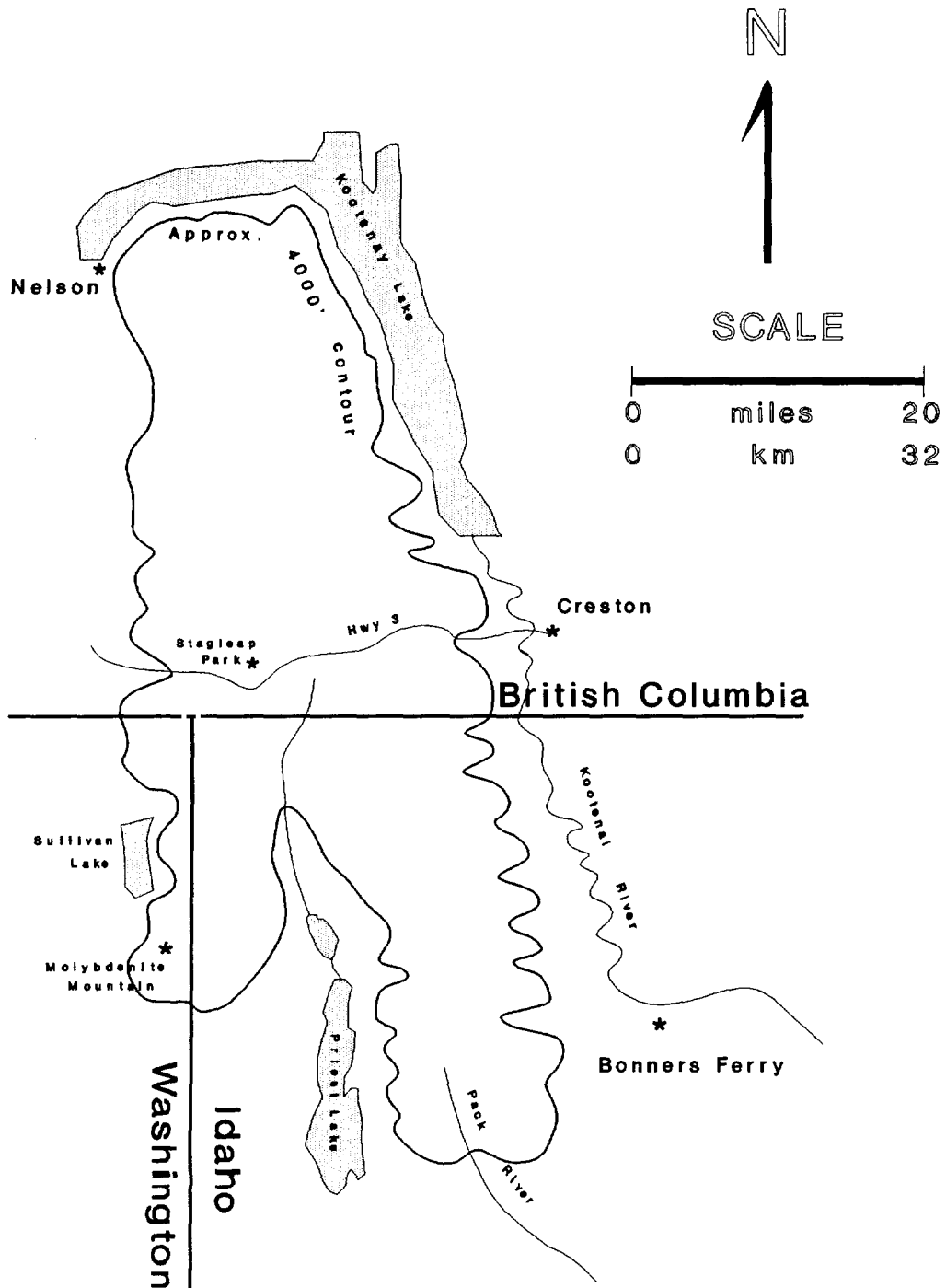
Priority	Task #	Task description	Task duration (yrs)	Responsible agency	Total cost (\$1000)	FY94	FY95	FY96	FY97	FY98
2	3142	Implement the CEM	C	USFS* BCFS USFWS	48 6 6					8 1 1
2	3143	Validate the CEM	6	IDFG WDW*	6 54					1 9
Need 3 total					1107	42	230	290	185	155
Need 4 - Population parameters										
2	321	Method to count & classify	7	WDW IDFG*	19 16	1 4	1 4	1 4	4 1	4 1
2	3221	Develop plan to monitor population trend	1	WDW IDFG*	2 8	2 8				
2	3222	Implement the plan	C	WDW IDFG*	TBD TBD		TBD TBD	TBD TBD	TBD TBD	TBD TBD
2	3311	Data for population model	C	IDFG*	0					
2	3312	Develop a population model	2	IDFG*	40	20	20			
2	3313	Determine recovered population size	1	IDFG* WDW USFWS BCFWB	0 0 0 0					
2	332	Determine habitat needed for recovery	2	IDFG* WDW USFS USFWS BCFWB	0 0 0 0 0					
2	334	Evaluate need for population outside the Selkirk	2	USFWS*	0					
Need 4 total					85	35	25	5	5	5

Recovery Plan Implementation Schedule for Selkirk Mountain Woodland Caribou

Priority	Task #	Task description	Task duration (yrs)	Responsible agency	Total cost (\$1000)	FY94	FY95	FY96	FY97	FY98
Need 5 - Information and Education										
2	41	Develop public information plan	1	IDFG*	3	3				
				WDW	1	1				
				USFS	1	1				
2	42	Implement the plan	C	IDFG*	95	5	10	10	10	10
				WDW	50	5	5	5	5	5
				USFS	50	5	5	5	5	5
2	43	Update plan periodically	Every 3 years	IDFG*	10			5		
				WDW	12.5			2.5		
				USFS	7.5			2.5		
				Need 5 total	230	20	20	30	20	20
Need 6 - Habitat concerns										
3	234	Evaluate the ecosystem approach	1	USFWS*	0					
3	31141	Determine important lichens	5	IDFG	5	1	1	1	1	1
				WDW	5	1	1	1	1	1
				USFS*	10	2	2	2	2	2
				BCFWB	5	1	1	1	1	1
3	31142	Methods to enhance lichens	5	IDFG	5	1	1	1	1	1
				WDW	5	1	1	1	1	1
				USFS*	10	2	2	2	2	2
				BCFWB	5	1	1	1	1	1
3	3231	Monitor <i>P. tenuis</i>	C	WDW	0					
				IDFG*	0					
3	3232	Monitor other pathogens	C	WDW	0					
				IDFG*	0					
				Need 6 total	50	10	10	10	10	10
				Total Costs	2554	218.5	591.5	594	415	255

APPENDIX A.

GENERAL HABITAT AREA FOR CARIBOU  
IN THE SOUTHERN SELKIRK MOUNTAINS



APPENDIX B.

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## **APPENDIX C.**

### **CONTENT ANALYSIS OF PUBLIC COMMENTS ON THE CARIBOU RECOVERY PLAN**

A number of methods have been developed to analyze the comments to projects made by the general public, agencies, and special interest groups. We chose "content analysis" because it has become a standard procedure, and is being refined and improved continually.

Content analysis provides a means of categorizing comments into separate subjects, then grouping subjects together so that concerns and reasoning about particular issues and alternatives can be more thoroughly examined. It provides a traceable, visible system for displaying public comments without interjecting interpretation or judgement. All substantive responses are captured.

Following is a tabular summary of the Caribou Recovery Plan content analysis. The complete analysis and supporting documents are on file at the U.S. Fish and Wildlife Service field office in Boise, Idaho.

Table 1. Number of comment letters (signatures) and type of support, by state, for the Caribou Recovery Plan.

State	Support <sup>1</sup>	Number of signatures
Arizona	YB	2
California	YB	2
Canada	YY	1
Colorado	YB	1
District of Columbia	YB	2
Florida	YY	1
Idaho	N	5
Idaho	U	3
Idaho	Y	8
Idaho	YB	19
Idaho	YY	3
Illinois	U	1
Illinois	YB	1
Maryland	YB	1
Minnesota	YB	1
Montana	Y	5
Montana	YB	16
New Jersey	YB	1
Ohio	U	1
Oregon	YB	1
Washington	U	1
Washington	Y	12
Washington	YB	17
Wisconsin	YB	1
-- <sup>2</sup>	N	5
--	U	18
--	Y	8
--	YB	10
--	YY	2

<sup>1</sup> N = Against recovery efforts.  
U = Unknown.  
Y = For recovery efforts.  
YB = For recovery, but Recovery Plan is insufficient.  
YY = For recovery, and Recovery Plan is OK.

<sup>2</sup> State of residence unknown.

Table 2. Type of support for the Caribou Recovery Plan  
as derived from the public comment letters.

Support <sup>1</sup>	Number of signatures
N	10
U	24
Y	33
YB	75
YY	7
Total	149

<sup>1</sup> See Table 1 for codes.

Table 3. Issues identified in the public comments on the Caribou Recovery Plan and a partial listing of where they are addressed in the Plan.

Issue	Where addressed
100 Habitat	
101 Caribou habitat needs	221, 311
102 Protect existing habitat	22
103 Historic range	I.B., I.F.
104 Fragmentation	II.B.2, II.B.21
105 Degradation of habitat	22, II.B.21
200 Impact on caribou (human disturbance)	
201 Cumulative effects	314
202 Timber harvest	I.F., 213
203 Recreation in general	214
204 Snowmobiles	I.G., 313
205 Hunting and/or poaching	I.E., Figs. 1,2
206 Vehicle accidents	I.E., Figs. 1,2
207 Roads and associated impacts	I.E., Figs. 1,2
208 Disease	I.E., Figs. 1,2
209 Predators	I.E., Figs. 1,2
210 Protection of other endangered species (wolf, grizzly bear)	I.C., 234
300 Forest management	
301 Fire	I.F., 211
302 Spruce bark beetle	I.F., 212
303 Other Forest Service management	213
400 The Recovery Plan	
401 Endangered Species Act	
402 Consultation process (Section 7)	
403 Designate critical habitat	I.C., 233
404 Recovery zone criteria/expand zone	
405 Recovered population criteria	II.A., 331
406 Ecosystem level approach	234
407 Aggressive vs maintenance approach	
408 More research needed	
409 Use available research	
500 Management	
501 Consistency and coordination	I.F., I.G.
502 Private lands	231
503 Public lands	223, 232

- 505 Montana
- 506 Canada I.G., 231
- 600 The Document
  - 601 Corrections
  - 602 Question the data used II.A.
  - 603 Tone of writing
  - 604 Mapping
- 700 Caribou population augmentation
  - 701 Subpopulation status I.E., 321,322
  - 702 Population augmentation I.G., 142
  - 703 Genetic status I.A., I.G.
  - 704 Caribou not endangered I.F.
- 800 Other
  - 801 Public involvement
  - 802 Need for education
  - 803 Warning / threat
  - 804 Offer assistance
  - 805 Request more information
  - 806 Funding for the caribou project
  - 807 Mistrust / suspicion
- 900 Effects of recovery on people
  - 901 Effect on private landowners
  - 902 Effect on miners
  - 903 Land exchange 2313
  - 904 Effect on timber operators and local economy
  - 905 Taxpayer's money
  - 906 Seeing caribou, protect for future generations
  - 907 Limited access